

**Addendum No. 1 – Safety Health and Emergency Response Plan
for the Site Specific Environmental Baseline Survey
and Building 2 Siding and Structural Steel Screening Study
St. Louis Army Ammunition Plant
August 14, 2003**

074X

Site:	SLAAP
ID #	104210021222
Break:	3.0
Other:	
LV	8/14/03

Approval Sheet: Replace with new sheet changing:

“Project Number 49-F0K96219.01” to “Job No. 16529783”
Site Safety Officer to “Michael Franano” at phone “913-344-1023”
Peer Reviewer to “David Convy” at phone “913-344-1153”
Add: Regional Health and Safety Manager “Dennis Day, CIH” at phone “402-952-2525”

Preparation Date to “August 14, 2003”
Expiration Date to “August 14, 2004”

Section 1, Pg. 1-1: Change the Health and Safety Representative” and Regional Health and Safety Manager telephone numbers to “913-344-1023” and “402-952-2525 cell 402 699-5437”

Add the following to the “Constituents of Concern” list:
10. Dioxins

Section 1, Pg. 1-2: Add the following Task to the Project Hazard Analysis:

Task	Chem. Hzds.	Heat/Cold Stress	Noise	Slip/Trip/Fall	Lifting Hzds.	Mech'l. Hzds.	Electrocution	Explosion	Excavation
12. Building Material Sampling	High	High	Low	High	Low	High	Med.	N/A	N/A

Section 1, Pg. 1-5: Add the following to the Health and Safety Equipment List:

HEALTH AND SAFETY EQUIPMENT LIST

Required	Recommended	
✓		Fall Protection Harness & Lanyard

40197490



SUPERFUND RECORDS

Section 2.2, Pg. 2-2: Add following bullet:

- “Building Material Sampling”

Section 2.2.9, Pg. 2-3: Revise the second sentence to read:

“Some of the wipe samples to be collected will require field personnel to enter confined spaces such as the base of an elevator shaft and underground tunnels, or to collect samples from a aerial lift at elevations up to 80 ft. above the floor.”

Section 2.2., Pg. 2-4: Add the following Section:

Section 2.2.13 Building Material Sampling

Transite siding wipe and bulk samples, and structural steel wipe samples will be sampled for characterization of PCB and Dioxin contamination. Some of these activities will require field personnel to collect samples from a aerial lift at elevations up to 80 ft. above the floor.

Section 5.1.1 Pg. 5-3: Add the following Section:

Dioxin is the common name of the Chlorinated dibenzo-p-dioxins compounds (CDDs). The most toxic chemical of these CDDs is 2,3,7,8-Tetrachlorodibenzo-p-Dioxin or 2,3,7,7-TCDD (2,3,7,7-TCDD), which is colorless, but occurs as an impurity in the manufacture of other chemicals including herbicides, fungicides and PCBs. It should be handled as a carcinogen and may be a teratogen. Contact can irritate and burn the skin and eyes, and exposure can cause headache, weakness, dizziness, nausea and vomiting, liver damage, and cause severe acne-like skin rash (chloracne) to develop which may persist for years. Dioxin can affect the nervous system with symptoms of weakness, personality and mood changes, pain in the legs, and numbness.

PEL = Carcinogen (None) IDLH = Carcinogen [N.D.]

Section 5.2.6, Pg. 5-6: Add following bullets:

- Follow Aerial Lifts Safety Management Standard 007
- Workers on aerial lift should exercise extreme caution when collecting samples.
- Workers should be aware of limited resistance to forces exerted during sampling activities due to the extended boom lift height.
- Workers should be aware of possible head knockers when working near ceilings or rafters.
- Portable hand tools and other objects used in the aerial lift should be tied off to prevent them from falling from the aerial lift and injuring those working below.

Table 1-1 Pg. 1 of 1: Add the following Activities:

**TABLE 1-1
CONTAMINANT HEALTH AND SAFETY INFORMATION
ST. LOUIS ARMY AMMUNITION PLANT, ST. LOUIS, MISSOURI**

Activity	Levels of Protection		Air Monitoring Instruments	Action Levels		Special Precautions
	Standard	Upgrade		Upgrade	Stop Work	
Building Material Sampling	C	None	None	None	None	Fall Protection, aerial lifts, portable ladders, dust

Table 5-1 Pg. 10 of 10: Add the following Activity:

**TABLE 5-1
Activity Hazard Analysis**

Activity: Building Material Sampling		
Principal Steps	Hazards	Controls
Clear location for portable ladder or aerial lift work, including gravel, debris and/or concrete rubble	• Ergonomics and Lifting	<ul style="list-style-type: none"> • Use proper equipment and/or get help when moving equipment • Do not strain when moving and manipulating equipment • Use proper position and do not twist your back • Refer to SMS 45, <i>Back Injury Prevention</i>
	• Lacerations and Puncture Wounds	<ul style="list-style-type: none"> • Keep tool guards in place • Always cut away from your body • Place saw blade or cutting edge down and keep it protected when equipment is not in use • Wear work gloves and safety glasses or goggles
	• Electrocution	<ul style="list-style-type: none"> • Use GFCI for electrical saw • Use a heavy duty, outdoor extension cord for electrical equipment • Ground electrical generator, if used
	• Environmental Contamination	<ul style="list-style-type: none"> • Building materials may contain PCBs or Dioxins • Wear appropriate PPE • Always keep dust to a minimum and if necessary apply mist to control airborne contaminants
	• Working around heavy equipment; Struck-by injury	<ul style="list-style-type: none"> • Wear bright orange vest, hardhat and safety glasses • Stay out of swing zone or work area of operating equipment • Make eye contact with operator before moving into work area • Do not position yourself between fixed objects and running equipment or between two running pieces of equipment • Verify that backup alarms are operating • Refer to SMS 19, <i>Heavy Equipment Operation</i>
Raise aerial lift	• Unit stability	<ul style="list-style-type: none"> • Situate the aerial lift on a flat surface • Use outriggers as necessary • Never move the rig with the boom up
	• Environmental Contamination	<ul style="list-style-type: none"> • Cuttings from the building materials may contain low levels of organic compounds • Contain cuttings in trash containers • Wear nitrile gloves and minimize contact with any stained or transite material • Use sampling equipment to handle materials remotely • Follow all provision of this Health and Safety Plan

Activity: Building Material Sampling		
Principal Steps	Hazards	Controls
	<ul style="list-style-type: none"> Dust (asbestos) 	<ul style="list-style-type: none"> Minimize generation of dust when cutting/breaking transite Wet transite if necessary
	<ul style="list-style-type: none"> Noise 	<ul style="list-style-type: none"> Wear hearing protecting when operating or working near the aerial lift or generator; refer to SMS 26, <i>Hearing Conservation</i>
	<ul style="list-style-type: none"> Hand tools 	<ul style="list-style-type: none"> Inspect tools prior to use Use tools for their intended use only Don't use damaged tools Push, don't pull pliers
	<ul style="list-style-type: none"> Pinch points 	<ul style="list-style-type: none"> Never place your hand or other body parts under or outside of aerial lift basket
Aerial lift Maintenance	<ul style="list-style-type: none"> Falls 	<ul style="list-style-type: none"> Fall protection is required when working at heights of greater than 6 feet (e.g., guard rails or a personal fall arrest system); refer to SMS 40, <i>Fall Protection</i> Make sure you have good solid footing
	<ul style="list-style-type: none"> Equipment energization 	<ul style="list-style-type: none"> Lockout and tagout is required if accidental energization of the aerial lift or power tools could cause injury Refer to SMS 23, <i>Lockout and Tagout Safety</i>
	<ul style="list-style-type: none"> Hand Tools 	<ul style="list-style-type: none"> See above
Decontaminate Portable ladder or aerial lift	<ul style="list-style-type: none"> Lifting 	<ul style="list-style-type: none"> See above
	<ul style="list-style-type: none"> Struck-by injury 	<ul style="list-style-type: none"> Use care when operating a high pressure water hose
	<ul style="list-style-type: none"> Burns 	<ul style="list-style-type: none"> Wear appropriate PPE to avoid burns from steam
All		<ul style="list-style-type: none"> Refer to URS SMS 007 and 028, <i>Aerial Lifts and Portable Ladders</i>
Equipment Used	Inspection Requirements	Training Requirements
<ul style="list-style-type: none"> Portable ladder or aerial lift Sampling tools Transite core drill and/or saw High pressure sprayer Hand tools Electric drill Support vehicles Generator 	<ul style="list-style-type: none"> Inspect the equipment daily or as required by the equipment manufacturer 	<ul style="list-style-type: none"> Field staff in lift and on ground must be trained and qualified to operate aerial lift equipment Hazard communication training is required where there is potential for exposure to hazards substances, refer to SMS 2, <i>Hazard Communication</i> Employees must be trained to use required protective equipment

Attachment A: Add the following URS Safety Management Standards (attached):

SMS 007 Aerial Lifts
SMS 028 Portable Ladders

Attachment C: Add the following Material Safety Data Sheet (attached):

Dioxin (2,3,7,8-Tetrachlorodibenzo-p-Dioxin)

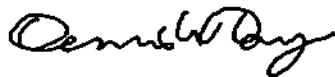
HEALTH AND SAFETY PLAN

PHONE

Job Number:	16529783	
Project Manager:	Robert F. Skach, P.E.	913-344-1158
Site Manager:	Matt Phoenix	913-344-1085
Site Safety Officer:	Michael Franano	913-344-1023
Peer Reviewer:	David Convy	913-344-1153
Regional Health and Safety Manager	Dennis Day, CIH' at phone	402-952-2525
Plan Preparer:	Matt Phoenix	913-344-1085
Preparation Date:	August 8, 2003	
Expiration Date:	August 8, 2004	

APPROVALS

Regional Health and Safety Manager:

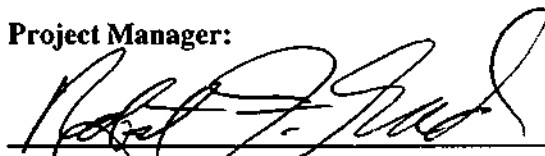


Dennis W. Day CIH, CSP

08-14-03

(DATE)

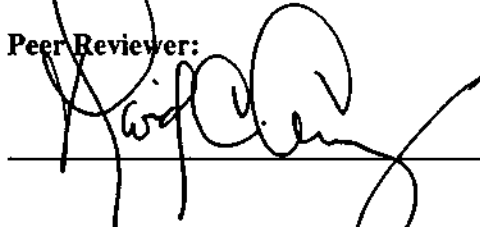
Project Manager:



8/14/03

(DATE)

Peer Reviewer:



8.14.03

(DATE)

This Health and Safety Plan is valid only for this specific project as described in Section 3.0. It is not to be used for other projects or subsequent phases of this project without the written approval of the Regional Health and Safety Manager. **A copy of this plan is to be maintained at the site at all times.**

URS SAFETY MANAGEMENT STANDARD

Crane Suspended Personnel Platforms (Manbaskets)

1. Applicability

This procedure applies to URS projects involving the use of manbaskets suspended from cranes.

2. Purpose and Scope

The purpose of this procedure is to establish safe work practices for the use of manbaskets, and to provide design, construction, and rigging requirements for manbaskets.

3. Implementation

Field Activities – Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

A. General

1. Use manbaskets **only when** no less hazardous means of access to elevations exist (e.g., ladders, aerial lifts, scaffolds, etc.)
2. Conduct and document (using Attachment 37-1) a pre-lift meeting to review the requirements and procedures to be followed. The crane operator, signal person(s), person(s) to be lifted, and the person responsible for the task must attend the meeting. A meeting must be conducted prior to the trial lift at each new work location, and repeated when any new employee is assigned to the operation.

B. Crane and Derrick Requirements

1. Require all cranes and derricks to be properly inspected in accordance with SMS 38, "Cranes".
2. Hoist the personnel platform in a slow, controlled manner with no sudden movements.
3. Require that load lines are capable of supporting at least seven (7) times the maximum intended load. Rotation resistant lines must be capable of supporting at least ten (10) times the maximum intended load.

URS SAFETY MANAGEMENT STANDARD

Crane Suspended Personnel Platforms (Manbaskets)

4. Engage all load and boom hoist drum brakes, swing brakes, and locking devices such as pawls or dogs when the occupied platform is in a stationary position.
5. Level the crane to within one percent (1%) of level grade, and fully extend outriggers in accordance with manufacturer's specifications.
6. Do not exceed fifty percent (50%) of the rated capacity for the crane's radius and configuration when hoisting loaded personnel baskets and associated rigging.
7. Prohibit the use of cranes or derricks with live booms.
8. Require that cranes with variable angle booms are equipped with a boom angle indicator that is readily visible to the operator.
9. Use only cranes which have been equipped with anti-two-blocking devices for personnel platform hoisting.
10. Determine the load radius to be used during the lift prior to hoisting personnel.
11. Always power down when lowering the basket. The use of the load hoist brake only and/or free falling is prohibited.

C. Personnel Platform Requirements

1. Use only platforms which have been designed by a qualified engineer specifically for personnel use, and which meet the requirements of U.S. OSHA Standard - Cranes and Derricks - 29 CFR 1926.550.
2. Do not load a personnel platform in excess of the rated load capacity.
3. Allow only the employees necessary to perform the work to occupy the platform, but never exceed 4 employees in the basket.
4. Use personnel platforms only for employees, their tools, and the materials necessary to do the work.
5. Do not use platforms for hoisting materials and tools when not hoisting personnel.

URS SAFETY MANAGEMENT STANDARD

Crane Suspended Personnel Platforms (Manbaskets)

6. Evenly distribute and secure tools and materials within the platform.

D. Rigging Requirements

1. Use a master link or shackle to connect each bridle leg when using a wire rope bridle to connect the personnel platform to the load line.
2. Require that crane hooks can be closed and locked, eliminating the throat opening or use an alloy anchor type shackle with a bolt, nut, and retaining pin for attachment of the platform to the load line.
3. Use thimbles when fabricating eyes in wire rope slings.
4. Tag all bridles and associated rigging used for attaching the platform to the hoist line "For Personnel Use Only", and do not use for any purpose other than hoisting personnel.

E. Trial Lift, Inspection, and Proof Testing by Designated Competent Person

1. Conduct a trial lift, with the unoccupied platform loaded at least to the anticipated lift weight, to each location at which the platform is to be hoisted and positioned immediately prior to placing personnel on the platform.
2. Repeat the trial lift whenever the crane is moved to a new location or when the lift route is changed.
3. Hoist and inspect the platform after the trial lift and before hoisting personnel. Correct any defects found during the inspection before hoisting personnel.
4. Proof test the platform at each jobsite to 125% of it's rated capacity prior to hoisting employees and after any repair or modification by holding it in a suspended position for 5 minutes with the test load evenly distributed on the platform.

F. Safe Work Practices

1. Require employees, except the signal person, to keep all parts of the body inside of the platform during raising, lowering, and positioning.
2. Use tag lines unless their use creates an unsafe condition.

URS SAFETY MANAGEMENT STANDARD

Crane Suspended Personnel Platforms (Manbaskets)

3. Secure platforms that are not landed to the structure before allowing employees to enter or exit.
4. Discontinue personnel hoisting operations upon indication of adverse weather conditions or other impending danger.
5. Require that employees being hoisted remain in sight of the operator or signal person. When this is not possible, radio communication may be used.
6. Do not make any lifts on another of the crane's load lines while personnel are suspended.
7. Direct the operator to remain at the controls at all times while the crane engine is running and the platform is occupied.
8. Require that all employees occupying the platform are using a body harness with the lanyard attached to the lower load block, or to a structural member within the platform capable of withstanding a fall impact.
9. Do not hoist employees while the crane is traveling.

5. Documentation Summary

File the following documents in the Project Health and Safety file:

- A. Pre-lift meeting documentation (Attachment 37-1)
- B. Documentation as required by SMS 38, "Cranes"

6. Resources

- A. U.S. OSHA Standard - Cranes and Derricks - 29 CFR 1926.550
- B. ANSI B30.5-1968
- C. U.S. OSHA Publication 3100 - Crane or Derrick Suspended Personnel Platforms
- D. Attachment 37-1 - Pre-lift Meeting Form

URS SAFETY MANAGEMENT STANDARD

Aerial Lifts

1. Applicability

This procedure applies to URS projects involving the use of scissors lifts, extendable boom platforms, aerial ladders, articulating boom platforms, vertical towers, or any combination thereof.

2. Purpose and Scope

The purpose of this procedure is to require the safe use and proper operation of the above mentioned lifts.

3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

- A. Require that the manufacturer's operating instruction manual be available onsite.
- B. Allow only trained, authorized personnel to operate aerial lifts.
- C. Inspect the unit for unsafe conditions each day prior to use. Units that have been damaged or weakened from any cause must be taken out of service until repairs are completed.
- D. Test the lift controls each day to determine they are in safe working order.
- E. Require that both lower and platform controls are plainly marked as to their function.
- F. Survey the route to be traveled immediately prior to the work trip to check for overhead obstructions, holes in pavement, slopes, ditches, or other potential hazards.
- G. Wear fall protection (SMS 40) in the form of a full body harness and lanyard attached to the manufacturer's prescribed anchorage point. Fall protection is not required for scissors lifts utilizing standard guardrails unless specifically required by the manufacturer.
- H. Stand firmly on the floor of the basket when working from an aerial lift. Sitting or climbing on the edge of the basket and/or use of planks, ladders, or other devices for work position are prohibited.

URS SAFETY MANAGEMENT STANDARD

Aerial Lifts

- I. Never exceed the boom and basket load limits set by the manufacturer.
- J. Set the braking system before elevating the basket.
- K. Install wheel chocks before using an aerial lift on an incline, provided they can be safely installed.
- L. Electrically ground or barricade aerial lifts when working near energized lines or equipment and consider the lift to be energized equipment.
- M. Do not pass equipment between a pole or structure and an aerial lift while an employee working from the basket is within reaching distance of energized conductors or equipment that are not covered with insulating protective equipment.
- N. Do not operate lower controls unless permission has been obtained from the employee in the basket, except in case of emergency.
- O. Alteration of the insulated portion of an aerial lift that may reduce the insulating value is not permitted.
- P. Never field modify an aerial lift for uses other than those intended by the manufacturer.

5. Documentation Summary

File the following documents in the Project Health and Safety File

- A. Copy of the cover page of the Manufacturer's Operation Manual.
- B. Training documentation.
- C. List of authorized employees.

6. Resources

- A. U.S. OSHA Standard - Aerial Lifts - 29 CFR 1926.453 or 1910.67
- B. U.S. OSHA Standard - Mechanical Equipment (power distribution) – 29 CFR 1926.952
- C. U.S. OSHA Standard - Overhead Lines - 29 CFR 1926.955

URS SAFETY MANAGEMENT STANDARD

Portable Ladders

1. Applicability

This procedure applies to URS office and field locations where portable ladders are used.

2. Purpose and Scope

The purpose of this procedure is to require the safe use and proper construction, inspection, and maintenance of ladders at URS fixed site and project locations.

3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

Office Locations - Implementation of this procedure is the responsibility of the Office Manager.

4. Requirements

A. General

1. Provide ladders for safe access to all elevations where permanent or temporary stairways or suitable ramps or runways are not provided.
2. Never use ladders with broken or missing rungs or steps, broken or split side rails, or other faulty or defective construction. When ladders with such defects are discovered, they shall immediately be withdrawn from service.
3. Place ladder feet on a substantial base and keep the area around the top and bottom of the ladder clear.
4. Do not place ladders in passageways, doorways, driveways, or any location where they may be displaced by activities being conducted in any other work, unless protected by barricades or guards.
5. Tie, block, or otherwise secure ladders while in use to prevent their being displaced.
6. Never use metal ladders for electrical work or where they or the user may contact electrical conductors.

URS SAFETY MANAGEMENT STANDARD

Portable Ladders

7. Require that ladders are equipped with non-skid safety feet.
8. Use only Type I Industrial wooden, fiberglass, or metal ladders.

B. Straight and Extension Ladders

1. Position straight and extension ladders at such a pitch that the horizontal distance from the top support to the foot of the ladder is about one-quarter of the working length of the ladder (one foot (30 cm) out for every four feet (1.2 meters) up).
2. Do not use ladders in a horizontal position as platforms, runways, or scaffolds.
3. Extend the side rails at least 36 inches (91 cm) above the landing. When this is not practical, install grab rails which provide a secure grip.
4. When using two section extension ladders, the two sections must have a minimum overlap of 3 feet (91 cm) for working lengths up to 33 feet (10 meters), and 4 feet (1.2 meters) for working lengths up to 44 feet (13 meters). Extension ladders must not exceed 44 feet (13 meters) in length when extended in accordance with this lap schedule.
5. Do not permit anyone to stand on the top three rungs of a straight or extension ladder.

C. Stepladders

1. Always fully open and lock side braces when using stepladders.
2. Use straight or extension ladders for access. Stepladders are meant to be used as temporary elevated working platforms only.
3. Do not place planks on the top steps of stepladders.
4. Never stand on the top two steps of a stepladder.
5. Require that all four feet of the ladder have an even, solid footing.

D. Training

Train each employee in the safe, proper use of ladders, including the following:

URS SAFETY MANAGEMENT STANDARD

Portable Ladders

1. Do not carry materials up or down - use a hand line.
2. Face the ladder when ascending or descending.
3. Position the ladder at the proper pitch.
4. Secure the top and bottom of the ladder to prevent displacement.
5. Require proper extension (3 feet/91 cm) above landing.
6. Never overreach - work only within an arm's length of the ladder.
7. Allow only one person on a ladder at a time.

E. Inspections

1. Conduct thorough periodic inspections of all ladders to identify cracks, broken rungs, and deterioration. Ladders found to be in an unsafe condition must be removed from the workplace immediately. When immediate removal is not possible, the ladder shall be conspicuously tagged "DANGER - DO NOT USE" until such time as removal is possible.
2. Inspect each ladder for unsafe conditions before each use.

5. Documentation Summary

Place in the Project Safety File

1. Site safety briefings regarding ladder use and inspection
2. Records of ladders taken out of service and/or removed from site

6. Resources

- A. U.S. OSHA Construction Standard - Stairways and Ladders - 29 CFR 1926, Subpart X
- B. U.S. OSHA Standard - Portable Ladders - 29 CFR 1910, Subpart D
- C. ANSI A.14.1 1982, Ladders
- D. ANSI A.14.2 1982, Ladders

URS SAFETY MANAGEMENT STANDARD
Portable Ladders

- E. Australian Standards AS1892.1-1996, AS1892.2-1992, AS1892.3-1996 -
Portable Ladders

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One Genium Plaza
Schenectady, NY 12304-4690
(518) 377-8854

Material Safety Data Sheet Collection

2, 3, 7, 8-Tetrachlorodibenzo-*p*-dioxin (TCDD)
MSDS No. 906
Date of Preparation: 6/94

Section 1 - Chemical Product and Company Identification**44****Product/Chemical Name:** 2, 3, 7, 8-Tetrachlorodibenzo-*p*-dioxin (TCDD)**Chemical Formula:** C₁₂H₄Cl₄O₂**CAS No.:** 1746-01-6**Synonyms:** dioxin; dioxine; NCI-C03714; tetrachlorodibenzodioxin; 2, 3, 7, 8-tetrachlorodibenzo(b, e)(1, 4)dioxin; 2, 3, 7, 8-tetrachlorodibenzo-1, 4-dioxin; TCDBD; TCDD; 2, 3, 7, 8-TCDD; tetradioxin**Derivation:** TCDD is not manufactured, but is formed as a by-product of chlorobenzenes, chlorophenols, and the herbicides 2, 4, 5-trichlorophenoxyacetic acid (2, 4, 5-T) and 2-(2, 4, 5-trichlorophenoxy)propionic acid (Silvex) which are produced from 2, 4, 5-trichlorophenol (TCP). 2, 4, 5-T, commonly known as Agent Orange, was the defoliant used during the Vietnam War. TCP, 2, 4, 5-T and Silvex are no longer commercially produced in the U.S. As a chemical and toxicological standard, TCDD can be prepared by catalytic condensation of potassium 2, 4, 5-trichlorophenolate. TCDD has been released to the environment during the incineration of chemical wastes including chlorinated benzenes, chlorophenols, and biphenyl ethers, from the improper disposal of certain chlorinated chemical wastes, in emissions from wood burning in the presence of chlorine, in accidental fires involving transformers containing PCBs, and from the use of the herbicides 2, 4, 5-T and Silvex.**General Use:** TCDD is an extremely toxic, unwanted by-product and essentially has no beneficial uses. It may be used as a research chemical.**Vendors:** Consult the latest *Chemical Week Buyers' Guide*. (73)**Section 2 - Composition / Information on Ingredients**

2, 3, 7, 8-Tetrachlorodibenzo-*p*-dioxin, ca 100 %wt. TCDD normally persists as a contaminant in TCP in variable amounts (0.07-6.2 mg/kg). Consequently, the concentrations of TCDD in different batches of Agent Orange varied greatly with an average concentration of about 2 ppm.

OSHA PEL*

None established

NIOSH REL

Carcinogen, lowest feasible concentration.

DFG (Germany) MAK

None established

ACGIH TLV

None established

* A preliminary occupational exposure limit of 0.2 ng/m³ (200 pg/m³) is recommended. It provides an ample margin of safety to prevent chloracne and takes into consideration the chronic effects of animal studies and accidental human exposure. [Leung HW et al; *American Industrial Hygiene Association Journal*, 49 (9): 466-74 b(1988)]

Section 3 - Hazards Identification**☆☆☆☆☆ Emergency Overview ☆☆☆☆☆**

TCDD is a colorless, crystalline solid at room temperature. It is highly toxic and a potential human carcinogen. Exposure to TCDD-contaminated materials may cause a severe and disabling acne-like rash that may persist for years (chloracne), metabolic disorders, and nervous system and liver damage. In animals, TCDD causes teratogenesis, tumorigenesis, and immunological dysfunction. Findings in humans are inconclusive, but human toxicology is under continuing investigation. Workers may be exposed to TCDD from residues from prior production or use of 2, 4, 5-T or Silvex, waste materials contaminated by TCDD, or contamination resulting from transformer fires. Take every precaution to avoid any exposure to TCDD.

Potential Health Effects**Primary Entry Routes:** Inhalation (dust),* skin contact, ingestion.**Target Organs:** Skin, liver, and nervous system.**Acute Effects****Inhalation:** Shortness of breath, headaches, fatigue, severe muscle pains, weakness, and digestive disturbance.

Most symptoms develop slowly, over many days.

Eye: Conjunctivitis and chemical burns.

Skin: Chemical burns. In most cases, chloracne appears within 2 to 4 weeks after initial exposure. It consists of blackheads with small, pale-yellow cysts. In severe cases, there may be papules (red spots) or even pustules (pus-filled spots). This acne-like rash appears on the cheekbones under the eyes and behind the ears in very mild cases. With increasing severity, the rest of the face and neck are affected and the outer upper arms, chest, back, abdomen, outer thighs and genitalia may be involved in varying degrees in the worst cases. In the worst cases, lesions may be active 15 or more years after the contact has ceased. Chloracne may also appear after ingestion or inhalation. Skin fragility, hirsutism (excessive growth of hair of normal or abnormal distribution), and photosensitivity may also occur.

Ingestion: Nausea, vomiting, and possible pancreatitis.**Wilson Risk Scale**

R 1
I 4
S 4*
K 1

*Skin absorption

HMIS

H 4†
F 1
R 0

†Chronic Effects

PPE‡

‡Sec. 8

Carcinogenicity: The IARC, NTP, MAK, and NIOSH list TCDD as an IARC-2B (possibly carcinogenic to humans: inadequate evidence of carcinogenicity in humans but there is sufficient evidence of carcinogenicity in experimental animals), an NTP-2 (reasonably anticipated to be a carcinogen: limited evidence from studies in humans or sufficient evidence from studies in experimental animals), an MAK-A2 (unmistakably carcinogenic in animal experimentation only), and a NIOSH-X (carcinogen defined with no further categorization). OSHA does not list TCDD as a carcinogen.

Medical Conditions Aggravated by Long-Term Exposure: Skin, liver, nervous and endocrine system disorders.

Chronic Effects: Lack of energy, loss of sex drive, personality and mood changes, numbness, weakness and pain in the legs, liver damage, chloracne, and elevated blood lipids. TCDD increased the incidence of a variety of tumors in animals, but human data is inconclusive. Little is known of the human health effects (if any) as a result of long-term exposures to low concentrations.

Comments: The observed health effects from clinical or epidemiological studies of populations who were occupationally and non-occupationally exposed cannot be solely attributed to TCDD because of the concurrent exposure to 2, 4, 5-T and TCP and to other herbicides as well. There is no report of human exposure to TCDD alone.

* Vapor inhalation is unlikely because TCDD has a low vapor pressure.

Section 4 - First Aid Measures

Inhalation: Remove exposed person to fresh air and support breathing as needed.

Eye Contact: Do not allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.

Skin Contact: Quickly remove contaminated clothing. Flush with water to remove solid particles; follow with a soap and water wash of exposed areas. For reddened or blistered skin, consult a physician.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center. Unless the poison control center advises otherwise, have the conscious and alert person drink 1 to 2 glasses of water, then induce vomiting.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: For an acute exposure, obtain liver function tests, CBC, prothrombin time, serum lipids, and uroporphyrins. EMG may be useful in detecting subclinical neuropathy. Current analytical techniques to detect dioxins in human tissue specimens involve gas chromatography and mass spectrometry. Chloracne may respond to topical retinoic acid, and oral tetracyclines may help secondary pustular follicles. Resistant cases may require dermabrasion or acne surgery. Isotretinoin may be tried.

Special Precautions/Procedures: Emergency personnel should protect against contamination.

Section 5 - Fire-Fighting Measures

Flash Point: None reported.

Autoignition Temperature: None reported.

LEL: None reported.

UEL: None reported.

Extinguishing Media: Use dry chemical, carbon dioxide, water spray, or foam extinguisher.

Unusual Fire or Explosion Hazards: None reported.

Hazardous Combustion Products: Toxic fumes of chlorine.

Fire-Fighting Instructions: Do not release runoff from fire control methods to sewers or waterways.

Fire-Fighting Equipment: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode.

Genium



Section 6 - Accidental Release Measures

Spill /Leak Procedures: Notify safety personnel of spill, evacuate all unnecessary personnel, remove heat and ignition sources, and provide adequate ventilation. Cleanup personnel should protect against skin and eye contact and dust inhalation.

Small Spills: Carefully collect and place in sealed containers for disposal.

Large Spills

Containment: For large spills, dike far ahead of liquid spill for later disposal. Do not release into sewers or waterways.

Cleanup: Avoid generating dust. Do not sweep! Provide an organized procedure of containment, collection, and disposal of contaminated solutions and residues generated during cleanup. Provide separate facilities for decontamination of large equipment. Conduct repetitive wash/rinse cycles separately, either by using different locations or by spacing in time.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120). For specific recommendations, contact your Department of Environmental Protection or your regional EPA office.

Section 7 - Handling and Storage

Handling Precautions: Handle with extreme caution. Take all the necessary precautions to avoid any exposure.

Storage Requirements: Store in tightly closed and properly labeled containers in a cool, well-ventilated area.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Isolate work areas involving TCDD or TCDD-contaminated materials.

Ventilation: Provide general or local exhaust ventilation systems to maintain airborne concentrations as low as possible. Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.⁽¹⁰³⁾

Administrative Controls: Consider preplacement and periodic medical examinations with emphasis on the skin, liver, nervous and endocrine systems. Regularly monitor glassware, bench tops, instruments, and tools with wipe tests (wipe with filter paper and measure amount of TCDD). **Respiratory Protection:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. For situations where TCDD contamination is low (e.g., exposure to dust contaminated with low levels of TCDD), wear an air-purifying respirator until the extent and characterization of the exposure can be determined. For materials highly contaminated with TCDD, wear respirators that consist of self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive pressure mode. An alternate method utilizes a combination Type C supplied-air respirator, with full facepiece, operated in a pressure-demand mode and equipped with auxiliary positive pressure self-contained air supply. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas. **Protective Clothing/Equipment:** Consider disposable clothing due to the uncertainty of adequate decontamination. Wear protective clothing consisting of both outer (zippered coverall with attached hood and draw string or elastic sleeves, gloves and closure boots) and inner (cotton overalls, undershirts, undershorts, gloves, and socks) garments. For dust or particulate exposure, wear coveralls of a non-woven fabric such as Tyvek or spun bonded polyethylene. For exposure to liquids, wear coveralls, gloves, and boots made of chemically resistant materials such as Saranex coated Tyvek or butyl, nitrile, or neoprene rubber. Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Contact lenses are not eye protective devices. Appropriate eye protection must be worn instead of, or in conjunction with contact lenses. **Safety Stations:** Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area. **Contaminated Equipment:** Shower and change clothes after potential exposures or at the end of the work day. Separate contaminated work clothes from street clothes. Launder before reuse. Place disposable clothing in marked and approved containers for disposal. Remove this material from your shoes and clean personal protective equipment. To prevent cross-contact, provide segregated decontamination locations with separate, controlled, and well-marked entry/exit routes and locations. **Comments:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9 - Physical and Chemical Properties

Physical State: Solid

Appearance and Odor: Colorless needles

Water Solubility: 19.3 ng/L

Other Solubilities: *o*-dichlorobenzene (1.4 g/L); chlorobenzene (0.72 g/L); benzene (0.57 g/L); chloroform (0.37 g/L); acetone (0.11 g/L); *n*-octanol (0.05 g/L); methanol (0.01 g/L); lard oil (0.04 g/L)

Vapor Pressure: 7.4×10^{-10} mm Hg at 77 °F (25 °C)

Formula Weight: 322

Melting Point: 581-583 °F (305-306 °C)

Octanol/Water Partition Coefficient: log K_{ow} = 7.02

Henry's Law Constant: 1.62×10^{-5} atm m³/mole at 25 °C (estimated)

Section 10 - Stability and Reactivity

Stability: TCDD is relatively stable toward heat, acids, and alkalis. It is changed chemically when exposed in isooctane or *n*-octanol to UV light. **Polymerization:** Hazardous polymerization cannot occur. **Chemical Incompatibilities:** None reported.

Conditions to Avoid: Avoid heat and ignition sources. **Hazardous Decomposition Products:** Thermal oxidative decomposition of TCDD can produce toxic fumes of chlorine. Decomposition begins at 932 °F (500 °C) and complete decomposition occurs within 21 sec at 1472 °F (800 °C).

Section 11- Toxicological Information

Toxicity Data:*

Eye Effects:

Rabbit, eye: 2 mg caused moderate irritation.

Acute Effects:

Human, skin, TD_{Lo}: 107 µg/kg produced dermatitis and allergic reaction.

Mammal, oral, LD₅₀: 4200 ng/kg produced changes of the liver, kidney, ureter, bladder, and spleen.

Rat, oral, LD₅₀: 20 µg/kg

Reproductive Effects:

Monkey, oral, TD_{Lo}: 92 ng/kg (46 weeks prior to mating, on each day during gestation, and for 17 weeks following birth) caused effects on the newborn (behavioral; delayed effects).

Genetic Effects (continued):

Human cell: 100 pmol/L caused unscheduled DNA synthesis.

Human cell: 10 nmol/L caused DNA inhibition.

Tumorigenic Effects:

Rat, oral: 52 µg/kg/2 yr (intermittent) caused liver and thyroid tumors.

Rat, oral: 27 µg/kg/65 weeks (continuous) caused liver and kidney tumors.

Multiple Dose:

Rat, oral: 6500 ng/kg/13 weeks (intermittent) caused changes in liver and thymus weight and pigmented or nucleated red blood cells.

Mouse, skin: 97 µg/kg/13 weeks (intermittent) caused diffuse hepatitis (hepatocellular necrosis); changes in spleen; and death.

* See NIOSH, RTECS (HP3500000), for additional toxicity data.

Section 12 - Ecological Information

Environmental Transport: Bioconcentration will occur in aquatic organisms. Due to TCDD's low solubility in water and lipids as well as its low partition coefficient in lipids, TCDD is not likely to accumulate in as many biological systems as DDT.

Environmental Degradation: When released to the atmosphere, gas-phase TCDD is degraded by reaction with hydroxyl radicals and direct photolysis (half-life = 8.3 days). Particulate-phase TCDD may be physically removed from air by wet and dry deposition. TCDD may be transported long distances through the atmosphere with surface water sediments being an ultimate environmental sink of airborne particulates. TCDD will absorb to sediment and limit the overall rate by which TCDD is removed from water. TCDD near the water's surface may experience significant photodegradation. 1.5 yr is the persistence half-life of TCDD in lakes. TCDD is generally resistant to biodegradation. Photodegradation on terrestrial surfaces may be an important transformation process. During warm conditions, volatilization from soil surfaces may be a major removal mechanism. Volatilization of TCDD from dry soil surfaces is likely to be faster than from wet soil surfaces. TCDD that has been mixed into soil depths beneath the upper surface boundary will volatilize extremely slowly. On soil surfaces, persistence half-life of TCDD on soil surfaces varies from less than 1 yr to 3 yr. Half-lives in soil interiors may be as long as 12 yr.

Soil Absorption/Mobility: TCDD is immobile in soil and is not expected to leach. Lateral movement due to surface erosion may occur.

Section 13 - Disposal Considerations

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

Section 14 - Transport Information**DOT Transportation Data (49 CFR 172.101):**

Shipping Name: Environmentally hazardous substances, solid, n.o.s.*

Shipping Symbols: —

Hazard Class: 9

ID No.: UN3077

Packing Group: III

Label: Class 9

Special Provisions (172.102): 8, B54, N50

* If it is in a quantity, in one package which equals or exceeds the RQ of 1 lb (0.454 kg).

Packaging Authorizations

a) Exceptions: 173.155

b) Non-bulk Packaging: 173.213

c) Bulk Packaging: 173.240

Quantity Limitations

a) Passenger, Aircraft, or Railcar: None

b) Cargo Aircraft Only: None

Vessel Stowage Requirements

a) Vessel Stowage: A

b) Other: —

Section 15 - Regulatory Information

EPA Regulations: RCRA Hazardous Waste (40 CFR 261.33): Not listed

Listed as a CERCLA Hazardous Substance (40 CFR 302.4) specific per CWA, Sec. 307(a)

CERCLA Reportable Quantity (RQ), 1 lb (0.454 kg)

SARA Toxic Chemical (40 CFR 372.65): Not listed

SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed

OSHA Regulations: Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A): Not listed

Section 16 - Other Information

References: 73, 103, 124, 132, 136, 139, 184, 187, 189, 190, 193

Prepared By: MJ Wurth, BS **Industrial Hygiene Review:** PA Roy, MPH, CIH **Medical Review:** T Thoburn, MD, MPH

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